With regard to the restoration in the flesh, the photograph which I send you was made by my friend Mr. C. H. Angas, a skilful delineator of animals, with such help as we could give him from the anatomist's point of view. There can, I think, be little doubt that in its general build the Diprotodon had considerable resemblance to a gigantic wombat, and as such we have drawn him. Opinions may, however, differ as to our treatment of the muzzle. The huge overarching nasals, which greatly exaggerate the somewhat similar formation in the tapir, and the very massive bony internarial septum, must indicate some special, and probably some protuberant, development of the soft parts in this region. Bearing in mind the many cranial, as well as other skeletal, resemblances between Diprotodon and Macropus, we have consequently assigned to the former in our restoration a snout of the same type as that of the latter animal, but of greatly exaggerated size and prominence. In the case of the ears, we have compromised between the extremes of length of those organs as they occur in the kangaroos and wombats, with. however. a nearer approach to the former proportions. The result, on the whole, has been to make the head appear much more like that of a very massive and bulky kangaroo than of a wombat. In the original sketch we have presumed the animal to be covered with a very dark short fur of wombat type. For a setting we have delineated the Diprotodon amidst surroundings that represent some *present* characteristics of Central Australia. Thus in the background, to the left, is part of the white expanse of one of those large salt-encrusted clay pans of which Lake Callabonna, where the bones were found, is an example. In the distance beyond the lake is shown one of the flat-topped hills that are very characteristic of the "desert sandstone" region of the interior. The vegetation in the foreground is chiefly "saltbush" (Atriplex spp.), some species of which, together with allied plants, having apparently formed the principal food of the Diprotodon, just as these now supply the chief sustenance of the introduced Herbivora, while here and there is a trailing plant of "parakylia" (Claytonia spp.), so well known to travellers in the dry central regions for its moisture-holding properties.

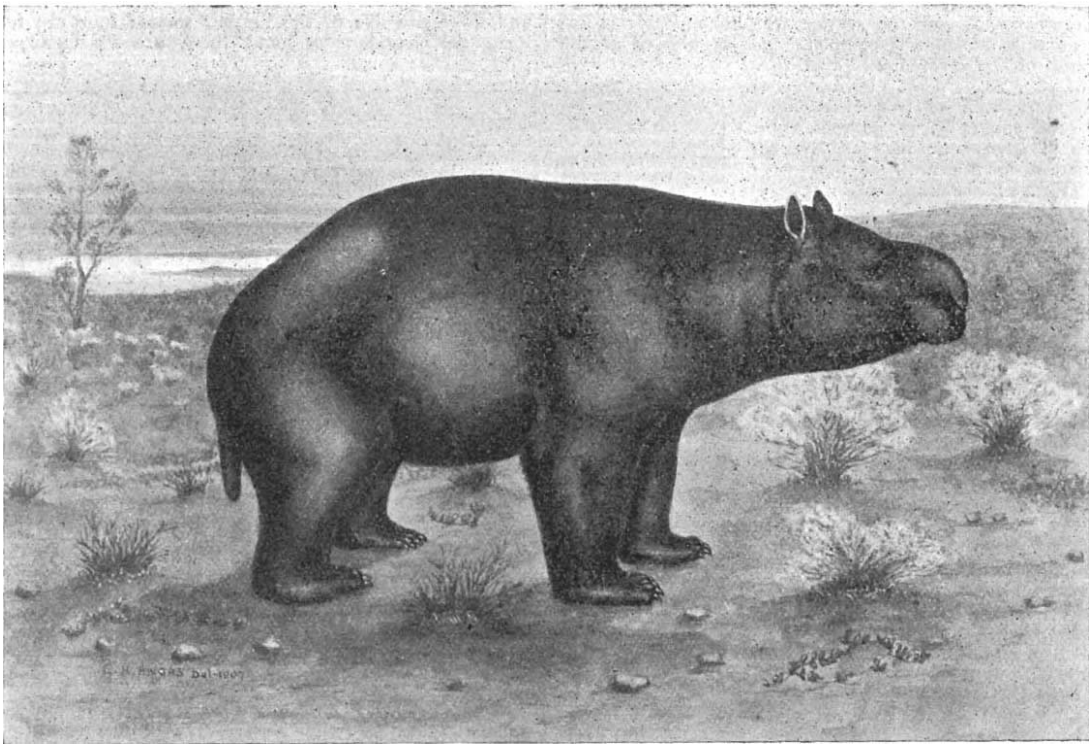

FIG. 2.—Restoration of *Diprotodon australis*.

I might add, though the information has already appeared in your columns, that a copy of this cast is in the possession of the Zoological Museum at Cambridge University, and that portions of it, together with some original bones, have been sent to the Natural History Department of the British Museum. Replicas of it have also been sent to the museums of Melbourne, Victoria, and of Perth, Western Australia.

E. C. STIRLING.

The Museum Adelaide, South Australia, August 6.

The Origin of Radium.

IN a communication published in NATURE of November 15, 1906, I described some experiments which had given results indicating the growth of radium in a preparation of thorium which had been previously precipitated in a solution of a uranium mineral. I had found from other experiments that the thorium after this treatment contained a radio-active body which did not decay appreciably in the course of several years. It was a simple matter to demonstrate that this active substance was not radium, uranium, or polonium, and I therefore assumed that it was actinium, since Debierne has stated (*C.R.*, cxxx., 906) that the chemical properties of actinium are similar to those of thorium, and since, moreover, an emanation which completely lost its activity in less than half a minute was evolved in small amounts from the oxides of the thorium treated in this manner. I therefore suggested that actinium was the parent of radium and the intermediate product between uranium and radium.

Rutherford has recently given an account (NATURE, June 6) of some experiments in the course of which a solution of actinium was successively precipitated with ammonium sulphide in order to remove the radium present. From the results obtained he concludes that the parent of radium is distinct from actinium, and is separated from the latter by precipitation with ammonium sulphide.

For the past ten months I have been continuing my

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experiments with the object of determining more definitely the properties and chemical behaviour of this elusive parent. The general manner of proceeding has been to obtain as complete a solution as possible of known weights of different uranium minerals. These solutions have been treated in the manner described in my earlier communication, with special precautions and modifications. The growth of radium in the solutions of the rare earths finally obtained was determined by measurements of the amount of radium emanation present at frequent intervals, and the rate of growth was calculated by an expression which took into account the rate of production of the emanation by the radium. The minerals used included carnotite, Joachimsthal pitchblende, gummite, uranophane, and a specimen of very pure uraninite from North Carolina containing only 0·03 per cent. of material insoluble in dilute nitric acid.

The space available in these columns will permit of only a brief mention of some of the more interesting results. In confirmation of Rutherford's statement it was found that the rate of production of radium was not influenced appreciably by the presence of radio-actinium and its products, which were completely absent from most of the solutions at the start. Continued observations of the growth of radium in the first solution prepared indicate that the rate of production of radium has been constant, within the limits of experimental error, for a period of more than 500 days.

I have attempted with one of my preparations to repeat the separation of the radium parent from actinium by the ammonium sulphide treatment which Rutherford has described. No separation could be detected when freshly prepared, pure ammonium sulphide was used. It was found that the radium parent can be quite completely separated from actinium by repeated precipitation with sodium thiosulphate under the conditions usual for the precipitation of thorium. In the case of a solution of the parent substance with thorium and other rare earths treated in this manner, less than 1 per cent. of the parent present remained in the filtrate, as was shown by the growth of radium in the two fractions obtained in this process. Since ammonium sulphide is always open to suspicion unless freshly prepared, and since on standing in loosely stoppered bottles it ultimately changes wholly into ammonium thiosulphate, it appears probable that the separation noticed by Rutherford was due to the latter reagent.

An interesting relation has been noticed between the growth of radium and the activity of the substances other than thorium in my solutions containing the radium parent. This proportionality is quite striking in those solutions containing the more completely purified salts. The activity of the substance present in these salts is comparatively high, and is about equal to the activity of the radium (itself) with which it is associated in the mineral. More significant still is the fact that this radioactive substance does not appear to possess any of the characteristic properties of the recognised radio-active elements. It is impossible that it is uranium, thorium, radium, or polonium. It has none of the properties that have been given as characteristic of actinium. About four-tenths of a gram of thorium oxide, containing an amount of this new body sufficient to give a leak of 500 divisions per minute in an α-ray electroscope, did not produce sufficient actinium emanation to permit its detection in another electroscope of greater sensitiveness. The thorium oxide had been prepared some weeks before by the gentle ignition of the oxalate, and was very porous. A strong current of air, about four litres per minute, was drawn over the preparation. There was no difficulty in measuring the thorium emanation evolved by this material under these conditions.

That the active substance is not actinium is also indicated by the fact that from a solution more than five months old no active substances other than thorium products could be separated by treatment with ammonia, by the formation of finely divided sulphur from sodium thiosulphate, or by the precipitation of considerable quantities of barium sulphate in the solution. The first process should have separated actinium X, and the two last should have separated radio-actinium had these products been present. The solution contained about 3 grams of thorium and a quantity of the new substance having an activity equal to that of about 35 grams of pure uranium.

Another important matter is the behaviour of the oxides obtained by strongly igniting the hydroxides precipitated by ammonia from a solution similar to the above. The activity of these oxides remains nearly constant for long periods, showing only a slight initial rise corresponding to the formation of thorium X in the thorium present. No rise corresponding to the formation of actinium X can be observed, but if actinium were present a separation of this product would be expected.

For these and certain other reasons I think that there is good cause for believing that uranium minerals contain an element emitting α rays, which is different from the other elements that have been identified, which produces no emanation, and which resembles thorium in its chemical properties. The activity of this element appears to be about the same as that of the radium (itself) with which it is associated in minerals. It is without doubt a product of uranium, and is probably the immediate parent of radium. It is very likely that this body is contained in Debierne's actinium preparations and in Giesel's "emanium" compounds, especially in the former, and its presence may perhaps explain the confusion which has resulted from Debierne's earlier assertions that actinium accompanied thorium as opposed to Giesel's positive statements to the contrary (*Chem. Berichte*, xl., 3011). The proportion of the total activity of a mineral due to the actinium present is very small, for the activity which can be attributed to actinium is less than 9 per cent. of the total.

The rate of disintegration of radium as determined from its growth in preparations similar to those described above, separated with great care from very pure North Carolina uraninite, indicates that the half-value period of this element is about 1900 years. It is hoped that certain experiments now in progress will make it possible to determine this factor with a satisfactory degree of certainty.

BERTRAM B. BOLTWOOD.
Sloane Laboratory, Yale University, New Haven, Conn., September 9.

The Body of Queen Tii.

IN NATURE of September 12, p. 494, a summary description was given of the remarkable discovery made by Mr. Theodore M. Davis, of Newport, R.I., of the tomb of the famous Egyptian Queen Tii, Thyi, or Teie, mother of the heretic-king Akhenaten, at Thebes. A remarkable point with regard to this discovery has been raised by an "Occasional Correspondent" of the *Times*, who informs us that the supposed remains of the queen, after having been examined by Dr. Elliot Smith, turn out to be those of a young man, at most twenty-five years of age! It is concluded therefrom that the discoverers were mistaken in their attribution of these remains, and that the coffin is not that of the queen at all, but of Akhenaten, whose name appears on it; but this cannot be the case. On the catafalque the inscription definitely states that it was given by Akhenaten to his mother Tii, and the mention of Akhenaten's name only on the coffin need mean also no more than this. The coffin is that of a queen; the diadem and necklace and other objects found are also the parure of a queen, not of a king, and the heads of the canopic jars are portraits of Tii.

The fact that the body found with these things is that of a man would mean simply that, as Prof. Sayce says in a letter on the subject published in the *Times* of September 17, "the mummy of the Queen had been torn to pieces like that of the King; and that, subsequently, when an attempt was made to put the tomb in order, the first mummy that came to hand was thrust into the Queen's jewelry wrappings, and coffin. It was not the first time that the Egyptians resorted to similar measures, and it would explain the otherwise puzzling absence of funeral furniture in the tomb."

In an article published in the *Graphic* of September 14 describing the tomb, I assumed that the weight of Dr. Elliot Smith's medical authority was decisive, and that therefore the body must be regarded as that of a man,

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